WHAT IS CLAIMED IS:

1. An information recording and reproducing apparatus comprising:

a noise correlation arithmetic operating unit which calculates a deviation of noises and a correlation of the noises for a present state which depend on input signal patterns of the present and past or future;

a storing unit which stores said correlation and deviation of said noises;

a white noise arithmetic operating unit which obtains white noise values for said input signal patterns in which colored noises are converted into white noises by using said correlation and deviation of the noises which were stored in said storing unit; and

an input signal arithmetic operating unit which calculates an input signal of a decoder from said white noise values and a deviation of the white noises.

2. An apparatus according to claim 1, wherein said decoder performs an MAP (Maximum A posteriori Probability) decoding or a Viterbi decoding as an iterative decoding.

3. An apparatus according to claim 1, wherein said white noise arithmetic operating unit obtains an equalized waveform mean value of a shortest path whose path metric is minimum among all of paths in past and future intervals which pass through a path which is shifted from a state that is one-precedent to the present state to the present state in the past and the future and presumes white equalization noise values.

4. An apparatus according to claim 1, wherein said noise correlation arithmetic operating unit processes the input signal patterns of only the past or future as targets.

5. An apparatus according to claim 1, wherein said noise correlation arithmetic operating unit obtains a mean value of equalized signals for the input signal patterns and obtains the correlation and deviation of the noises which depend on the input signal patterns on the basis of a difference between an equalized waveform and said mean value.

6. An apparatus according to claim 1, wherein in case of magnetically recording and reproducing a code with restriction conditions such as an MTR restriction and the like, said noise correlation arithmetic operating unit obtains the correlation and deviation of the noises which depend on the input signal patterns by training using random input signals without a restriction.

7. An apparatus according to claim 1, wherein said noise correlation arithmetic operating unit stores said correlation and deviation of the noises into said storing unit at predetermined off-track intervals of a reproducing head in a track width direction, detects an off-track amount from a change in amplitude value of a preamble part of a sector, reads out the correlation and deviation of the noises according to said off-track amount from said storing unit, and uses them for decoding.

8. An apparatus according to claim 1, wherein said noise

correlation arithmetic operating unit stores the correlation and deviation of the noises into said storing unit every zone, every cylinder, or every sector and uses them for each decoding.

9. An apparatus according to claim 1, wherein said noise correlation arithmetic operating unit obtains the correlation and deviation of the noises from a reproduced signal of a training series recorded in a training sector or a training cylinder of a medium.

10. An apparatus according to claim 1, wherein said noise correlation arithmetic operating unit obtains the correlation and deviation of the noises by correcting the correlation and deviation of the noises stored in said storing unit in accordance with an amplitude value of a preamble of every sector of a medium.

11. An apparatus according to claim 1, wherein said noise correlation arithmetic operating unit calculates the correlation and deviation of the noises again at certain specific timing and updates said storing unit.

12. An information recording and reproducing apparatus comprising:

an equalizer having an equalization target in which noises obtained after an equalization become close to white noises;

a noise correlation arithmetic operating unit which calculates a deviation of noises for a present time point which depend on input signal patterns of the present and past or future in response to an input

signal from said equalizer;

a storing unit which stores said deviation of said noises; and

an input signal arithmetic operating unit which calculates an input signal of a decoder from said deviation stored in said storing unit.

13. An apparatus according to claim 12, wherein said decoder performs an MAP (Maximum A posteriori Probability) decoding or a Viterbi decoding as an iterative decoding.

14. An apparatus according to claim 12, wherein said noise correlation arithmetic operating unit obtains an equalized waveform mean value of a shortest path whose path metric is minimum among all of paths in past and future intervals which pass through a path which is shifted from a state that is one-precedent to the present state to the present state in the past and the future and presumes white equalization noise values.

15. An apparatus according to claim 12, wherein said noise correlation arithmetic operating unit processes the input signal patterns of only the past or future as targets.

16. An apparatus according to claim 12, wherein said noise correlation arithmetic operating unit obtains a mean value of equalized signals for the input signal patterns and obtains the deviation of the noises which depend on the input signal patterns on the basis of a difference between an equalized waveform and said mean value.

17. An apparatus according to claim 12, wherein in case of magnetically recording and reproducing a code with restriction conditions such as an MTR restriction and the like, said noise correlation arithmetic operating unit obtains the deviation of the noises which depend on the input signal patterns by training using random input signals without a restriction.

18. An apparatus according to claim 12, wherein said noise correlation arithmetic operating unit stores said deviation of the noises into said storing unit at predetermined off-track intervals of a reproducing head in a track width direction, detects an off-track amount from a change in amplitude value of a preamble of a medium, reads out said deviation of the noises according to said off-track amount from said storing unit, and uses it for decoding.

19. An apparatus according to claim 12, wherein said noise correlation arithmetic operating unit stores said deviation of the noises into said storing unit every zone, every cylinder, or every sector and uses it for each decoding.

20. An apparatus according to claim 12, wherein said noise correlation arithmetic operating unit obtains the deviation of the noises from a reproduced signal of a training series recorded in a training sector or a training cylinder of a medium.

21. An apparatus according to claim 12, wherein said noise correlation arithmetic operating unit obtains the deviation of the noises

by correcting said deviation of the noises stored in said storing unit in accordance with an amplitude value of a preamble of every sector of a medium.

22. An apparatus according to claim 12, wherein said noise correlation arithmetic operating unit calculates the deviation of the noises again at certain specific timing and updates said storing unit.

23. An information recording and reproducing apparatus comprising:

an equalizer having an equalization target in which noises obtained after an equalization become close to white noises;

a noise correlation arithmetic operating unit which calculates a deviation of noises for a present time point which depend on input signal patterns of the present and past or future in response to an input signal from said equalizer;

a storing unit which stores said deviation of said noises; and

a sliding window processing unit which divides a series of an input signal obtained after an equalization into small window series and calculates a likelihood of the input signal from said deviation stored in said storing unit in the order of said window series.

24. An apparatus according to claim 23, wherein said sliding window processing unit performs an MAP (Maximum A posteriori Probability) decoding or a Viterbi decoding as an iterative decoding.

25. An apparatus according to claim 23, wherein said noise

correlation arithmetic operating unit obtains an equalized waveform mean value of a shortest path whose path metric is minimum among all of paths in past and future intervals which pass through a path which is shifted from a state that is one-precedent to the present state to the present state in the past and the future and presumes white equalization noise values.

26. An apparatus according to claim 23, wherein said noise correlation arithmetic operating unit processes the input signal patterns of only the past or future as targets.

27. An apparatus according to claim 23, wherein said noise correlation arithmetic operating unit obtains a mean value of equalized signals for the input signal patterns and obtains the deviation of the noises which depend on the input signal patterns on the basis of a difference between an equalized waveform and said mean value.

28. An apparatus according to claim 23, wherein in case of magnetically recording and reproducing a code with restriction conditions such as an MTR restriction and the like, said noise correlation arithmetic operating unit obtains the deviation of the noises which depend on the input signal patterns by training using random input signals without a restriction.

29. An apparatus according to claim 23, wherein said noise correlation arithmetic operating unit stores said deviation of the noises into said storing unit at predetermined off-track intervals of a

reproducing head in a track width direction, detects an off-track amount from a change in amplitude value of a preamble part of a sector, reads out said deviation of the noises according to said off-track amount from said storing unit, and uses it for decoding.

30. An apparatus according to claim 23, wherein said noise correlation arithmetic operating unit stores said deviation of the noises into said storing unit every zone, every cylinder, or every sector and uses it for each decoding.

31. An apparatus according to claim 23, wherein said noise correlation arithmetic operating unit obtains the deviation of the noises from a reproduced signal of a training series recorded in a training sector or a training cylinder of a medium.

32. An apparatus according to claim 23, wherein said noise correlation arithmetic operating unit obtains the deviation of the noises by correcting said deviation of the noises stored in said storing unit in accordance with an amplitude value of a preamble of every sector of a medium.

33. An apparatus according to claim 23, wherein said noise correlation arithmetic operating unit calculates the deviation of the noises again at certain specific timing and updates said storing unit.

34. An information recording and reproducing method comprising the steps of:

obtaining a deviation of noises and a correlation of the noises for a present time point which depend on input signal patterns of the present and past or future and storing them;

obtaining white noise values for said input signal patterns in which colored noises are converted into white noises by using said correlation and deviation of the noises; and

calculating an input signal of a decoding process from said white noise values and a deviation of the white noises.

35. A method according to claim 34, wherein in said decoding process, an MAP (Maximum A posteriori Probability) decoding or a Viterbi decoding is performed as an iterative decoding.

36. A method according to claim 34, wherein an equalized waveform mean value of a shortest path whose path metric is minimum among all of paths in past and future intervals which pass through a path which is shifted from a state that is one-precedent to the present state to the present state in the past and the future is obtained and white equalization noise values are presumed.

37. A method according to claim 34, wherein the input signal patterns of only the past or future are processed as targets.

38. A method according to claim 34, wherein a mean value of equalized signals for the input signal patterns is obtained and the correlation and deviation of the noises which depend on the input signal patterns are obtained on the basis of a difference between an equalized

waveform and said mean value.

39. A method according to claim 34, wherein in case of magnetically recording and reproducing a code with restriction conditions such as an MTR restriction and the like, the correlation and deviation of the noises which depend on the input signal patterns are obtained by training using random input signals without a restriction.

40. A method according to claim 34, wherein the correlation and deviation of the noises are stored into a storing unit at predetermined off-track intervals of a reproducing head in a track width direction, an off-track amount is detected from a change in amplitude value of a preamble part of a sector, and the correlation and deviation of the noises according to said off-track amount are read out from said storing unit and used for decoding.

41. A method according to claim 34, wherein the correlation and deviation of the noises are stored every zone, every cylinder, or every sector and used for each decoding.

42. A method according to claim 34, wherein the correlation and deviation of the noises are obtained from a reproduced signal of a training series recorded in a training sector or a training cylinder of a medium.

43. A method according to claim 34, wherein the stored correlation and deviation of the noises are obtained by correcting the

correlation and deviation of the noises in accordance with an amplitude value of a preamble of every sector of a medium.

44. A method according to claim 34, wherein the correlation and deviation of the noises are calculated again at certain specific timing and storage contents are updated.

45. An information recording and reproducing method comprising the steps of:

calculating a deviation of noises at a present time point which depend on input signal patterns of the present and past or future with respect to an equalized signal in which noises obtained after an equalization become close to white noises as a target and storing said deviation; and

calculating an input signal of a decoding process from said stored deviation.

46. A method according to claim 45, wherein in said decoding process, an MAP (Maximum A posteriori Probability) decoding or a Viterbi decoding is performed as an iterative decoding.

47. A method according to claim 45, wherein an equalized waveform mean value of a shortest path whose path metric is minimum among all of paths in past and future intervals which pass through a path which is shifted from a state that is one-precedent to the present state to the present state in the past and the future is obtained and white equalization noise values are presumed.

48. A method according to claim 45, wherein the input signal patterns of only the past or future are processed as targets.

49. A method according to claim 45, wherein a mean value of equalized signals for the input signal patterns is obtained and the deviation of the noises which depend on the input signal patterns are obtained on the basis of a difference between an equalized waveform and said mean value.

50. A method according to claim 45, wherein in case of magnetically recording and reproducing a code with restriction conditions such as an MTR restriction and the like, the deviation of the noises which depend on the input signal patterns are obtained by training using random input signals without a restriction.

51. A method according to claim 45, wherein the deviation of the noises are stored into a storing unit at predetermined off-track intervals of a reproducing head in a track width direction, an off-track amount is detected from a change in amplitude value of a preamble part of a sector, and the deviation of the noises according to said off-track amount are read out from said storing unit and used for decoding.

52. A method according to claim 45, wherein the deviation of the noises are stored every zone, every cylinder, or every sector and used for each decoding.

53. A method according to claim 45, wherein the deviation of the noises are obtained from a reproduced signal of a training series recorded in a training sector or a training cylinder of a medium.

54. A method according to claim 45, wherein the stored deviation of the noises are obtained by correcting the deviation of the noises in accordance with an amplitude value of a preamble of every sector of a medium.

55. A method according to claim 45, wherein the deviation of the noises are calculated again at certain specific timing and storage contents are updated.

56. An information recording and reproducing method of performing an MAP (Maximum A posteriori Probability) decoding, comprising the steps of:

calculating a deviation of noises for past and future states which depend on input signal patterns in the past and future with respect to an input signal series, as a target, obtained after an equalization in which noises obtained after the equalization become close to white noises and storing it; and

dividing the input signal series obtained after the equalization into small window series and calculating a likelihood of an input signal from said stored deviation in the order of said window series while sliding.

57. A method according to claim 56, wherein the MAP (Maximum

A posteriori Probability) decoding or a Viterbi decoding is performed as an iterative decoding according to said sliding process.

58. A method according to claim 56, wherein an equalized waveform mean value of a shortest path whose path metric is minimum among all of paths in past and future intervals which pass through a path which is shifted from a state that is one-precedent to the present state to the present state in the past and the future is obtained and white equalization noise values are presumed.

59. A method according to claim 56, wherein the input signal patterns of only the past or future are processed as targets.

60. A method according to claim 56, wherein a mean value of equalized signals for the input signal patterns is obtained and the deviation of the noises which depend on the input signal patterns is obtained on the basis of a difference between an equalized waveform and said mean value.

61. A method according to claim 56, wherein in case of magnetically recording and reproducing a code with restriction conditions such as an MTR restriction and the like, the deviation of the noises which depend on the input signal patterns is obtained by training using random input signals without a restriction.

62. A method according to claim 56, wherein the deviation of the noises is stored at predetermined off-track intervals of a reproducing

head in a track width direction, an off-track amount is detected from a change in amplitude value of a preamble part of a medium, and the deviation of the noises according to said off-track amount is read out from said storage contents and used for decoding.

63. A method according to claim 56, wherein the deviation of the noises is stored every zone, every cylinder, or every sector and used for each decoding.

64. A method according to claim 56, wherein the deviation of the noises is obtained from a reproduced signal of a training series recorded in a training sector or a training cylinder of a medium.

65. A method according to claim 56, wherein the deviation of the noises is obtained by correcting said stored deviation of the noises in accordance with an amplitude value of a preamble of every sector of a medium.

66. A method according to claim 56, wherein the deviation of the noises is calculated again at certain specific timing and storage contents are updated.

67. A signal decoding circuit comprising:

a noise correlation arithmetic operating unit which calculates a deviation of noises and a correlation of the noises for a present state which depend on input signal patterns of the present and past or future;

a storing unit which stores said correlation and deviation of

said noises;

a white noise arithmetic operating unit which obtains white noise values for said input signal patterns in which colored noises are converted into white noises by using said correlation and deviation of the noises which were stored in said storing unit; and

an input signal arithmetic operating unit which calculates an input signal of a decoder from said white noise values and a deviation of the white noises.

68. A circuit according to claim 67, wherein said decoder performs an MAP (Maximum A posteriori Probability) decoding or a Viterbi decoding as an iterative decoding.

69. A circuit according to claim 67, wherein said white noise arithmetic operating unit obtains an equalized waveform mean value of a shortest path whose path metric is minimum among all of paths in past and future intervals which pass through a path which is shifted from a state that is one-precedent to the present state to the present state in the past and the future and presumes white equalized noise values.

70. A circuit according to claim 67, wherein said noise correlation arithmetic operating unit processes the input signal patterns of only the past or future as targets.

71. A circuit according to claim 67, wherein said noise correlation arithmetic operating unit obtains a mean value of equalized signals for the input signal patterns and obtains the correlation and deviation of the

noises which depend on the input signal patterns on the basis of a difference between an equalized waveform and said mean value.

72. A circuit according to claim 67, wherein in case of magnetically recording and reproducing a code with restriction conditions such as an MTR restriction and the like, said noise correlation arithmetic operating unit obtains the correlation and deviation of the noises which depend on the input signal patterns by training using random input signals without a restriction.

73. A circuit according to claim 67, wherein said noise correlation arithmetic operating unit stores said correlation and deviation of the noises into said storing unit at predetermined off-track intervals of a reproducing head in a track width direction, detects an off-track amount from a change in amplitude value of a preamble part of a sector, reads out the correlation and deviation of the noises according to said off-track amount from said storing unit, and uses them for decoding.

74. A circuit according to claim 67, wherein said noise correlation arithmetic operating unit stores the correlation and deviation of the noises into said storing unit every zone, every cylinder, or every sector and uses them for each decoding.

75. A circuit according to claim 67, wherein said noise correlation arithmetic operating unit obtains the correlation and deviation of the noises from a reproduced signal of a training series recorded in a training sector or a training cylinder of a medium.

76. A circuit according to claim 67, wherein said noise correlation arithmetic operating unit obtains the correlation and deviation of the noises by correcting the correlation and deviation of the noises stored in said storing unit in accordance with an amplitude value of a preamble of every sector of a medium.

77. A circuit according to claim 67, wherein said noise correlation arithmetic operating unit calculates the correlation and deviation of the noises again at certain specific timing and updates said storing unit.

78. A signal decoding circuit comprising:

an equalizer having an equalization target in which noises obtained after an equalization become close to white noises;

a noise correlation arithmetic operating unit which calculates a deviation of noises for a present time point which depend on input signal patterns of the present and past or future in response to an input signal from said equalizer;

a storing unit which stores said deviation of said noises; and

an input signal arithmetic operating unit which calculates an input signal of a decoder from said deviation stored in said storing unit.

79. A circuit according to claim 78, wherein an MAP (Maximum A posteriori Probability) decoding or a Viterbi decoding is performed as an iterative decoding.

80. A circuit according to claim 78, wherein said noise correlation

arithmetic operating unit obtains an equalized waveform mean value of a shortest path whose path metric is minimum among all of paths in past and future intervals which pass through a path which is shifted from a state that is one-precedent to the present state to the present state in the past and the future and presumes white equalization noise values.

81. A circuit according to claim 78, wherein said noise correlation arithmetic operating unit processes the input signal patterns of only the past or future as targets.

82. A circuit according to claim 78, wherein said noise correlation arithmetic operating unit obtains a mean value of equalized signals for the input signal patterns and obtains the deviation of the noises which depend on the input signal patterns on the basis of a difference between an equalized waveform and said mean value.

83. A circuit according to claim 78, wherein in case of magnetically recording and reproducing a code with restriction conditions such as an MTR restriction and the like, said noise correlation arithmetic operating unit obtains the deviation of the noises which depend on the input signal patterns by training using random input signals without a restriction.

84. A circuit according to claim 78, wherein said noise correlation arithmetic operating unit stores said deviation of the noises into said storing unit at predetermined off-track intervals of a reproducing head in a track width direction, detects an off-track amount from a change in

amplitude value of a preamble part of a sector, reads out said deviation of the noises according to said off-track amount from said storing unit, and uses it for decoding.

85. A circuit according to claim 78, wherein said noise correlation arithmetic operating unit stores said deviation of the noises into said storing unit every zone, every cylinder, or every sector and uses it for each decoding.

86. A circuit according to claim 78, wherein said noise correlation arithmetic operating unit obtains the deviation of the noises from a reproduced signal of a training series recorded in a training sector or a training cylinder of a medium.

87. A circuit according to claim 78, wherein said noise correlation arithmetic operating unit obtains the deviation of the noises by correcting said deviation of the noises stored in said storing unit in accordance with an amplitude value of a preamble of every sector of a medium.

88. A circuit according to claim 78, wherein said noise correlation arithmetic operating unit calculates the deviation of the noises again at certain specific timing and updates said storing unit.

89. A signal decoding circuit comprising:

an equalizer having an equalization target in which noises obtained after an equalization become close to white noises;

a noise correlation arithmetic operating unit which calculates

a deviation of noises for a present time point which depend on input signal patterns of the present and past or future in response to an input signal from said equalizer;

a storing unit which stores said deviation of said noises; and

a sliding window processing unit which divides a series of an input signal obtained after an equalization into small window series and calculates a likelihood of the input signal from said deviation stored in said storing unit in the order of said window series.

90. A circuit according to claim 89, wherein an MAP (Maximum A posteriori Probability) decoding or a Viterbi decoding is performed as an iterative decoding.

91. A circuit according to claim 89, wherein said noise correlation arithmetic operating unit obtains an equalized waveform mean value of a shortest path whose path metric is minimum among all of paths in past and future intervals which pass through a path which is shifted from a state that is one-precedent to the present state to the present state in the past and the future and presumes white equalized noise values.

92. A circuit according to claim 89, wherein said noise correlation arithmetic operating unit processes the input signal patterns of only the past or future as targets.

93. A circuit according to claim 89, wherein said noise correlation arithmetic operating unit obtains a mean value of equalized signals for the input signal patterns and obtains the deviation of the noises which

depend on the input signal patterns on the basis of a difference between an equalized waveform and said mean value.

94. A circuit according to claim 89, wherein in case of magnetically recording and reproducing a code with restriction conditions such as an MTR restriction and the like, said noise correlation arithmetic operating unit obtains the deviation of the noises which depend on the input signal patterns by training using random input signals without a restriction.

95. A circuit according to claim 89, wherein said noise correlation arithmetic operating unit stores said deviation of the noises into said storing unit at predetermined off-track intervals of a reproducing head in a track width direction, detects an off-track amount from a change in amplitude value of a preamble part of a sector, reads out said deviation of the noises according to said off-track amount from said storing unit, and uses it for decoding.

96. A circuit according to claim 89, wherein said noise correlation arithmetic operating unit stores said deviation of the noises into said storing unit every zone, every cylinder, or every sector and uses it for each decoding.

97. A circuit according to claim 89, wherein said noise correlation arithmetic operating unit obtains the deviation of the noises from a reproduced signal of a training series recorded in a training sector or a training cylinder of a medium.

98. A circuit according to claim 89, wherein said noise correlation arithmetic operating unit obtains the deviation of the noises by correcting said deviation of the noises stored in said storing unit in accordance with an amplitude value of a preamble of every sector of a medium.

99. A circuit according to claim 89, wherein said noise correlation arithmetic operating unit calculates the deviation of the noises again at certain specific timing and updates said storing unit.